

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference P101097WO02	FOR FURTHER ACTION		See item 4 below
International application No. PCT/GB2008/050319	International filing date (<i>day/month/year</i>) 02 May 2008 (02.05.2008)	Priority date (<i>day/month/year</i>) 02 May 2007 (02.05.2007)	
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237			
Applicant PURSUIT DYNAMICS PLC			

<p>1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 <i>bis</i>.1(a).</p> <p>2. This REPORT consists of a total of 8 sheets, including this cover sheet.</p> <p>In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.</p>																								
<p>3. This report contains indications relating to the following items:</p> <table> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. I</td> <td>Basis of the report</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table> <p>4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44<i>bis</i>.3(c) and 93<i>bis</i>.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44<i>bis</i> .2).</p>	<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input type="checkbox"/>	Box No. II	Priority	<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/>	Box No. VI	Certain documents cited	<input type="checkbox"/>	Box No. VII	Certain defects in the international application	<input checked="" type="checkbox"/>	Box No. VIII	Certain observations on the international application
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	Date of issuance of this report 03 November 2009 (03.11.2009)
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PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/GB2008/050319

International filing date (day/month/year)
02.05.2008

Priority date (day/month/year)
02.05.2007

International Patent Classification (IPC) or both national classification and IPC
INV. C13K1/02 D21B1/16 C12P19/14 B01F5/04 B05B7/06

Applicant
PURSUIT DYNAMICS PLC

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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Date of completion of
this opinion

see form
PCT/ISA/210

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2008/050319

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ on paper
 - ☐ in electronic form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in electronic form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2008/050319

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>3,5,8,10,11,19,21,22,25,27</u>
	No: Claims	<u>1,2,4,6,7,9,12-18,20,23,24,26</u>
Inventive step (IS)	Yes: Claims	<u>3,8,11</u>
	No: Claims	<u>1,2,4-7,9,10,12-27</u>
Industrial applicability (IA)	Yes: Claims	<u>1-27</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

Reference is made to the following documents:

- D1: US-A-4 201 596 (BURROUGHS REGINALD L [US] ET AL) 6 May 1980
- D2: GB-A-1 028 211 (ESCHER WYSS GMBH) 4 May 1966
- D3: GB-A-995 660 (ESCHER WYSS GMBH) 23 June 1965
- D4: US 2003/147301 A1 (EKHOLM ROLF [SE]) 7 August 2003

1. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1 and 2 is not new in the sense of Article 33(2) PCT.

The document D1 discloses (abstract and column 3, line 23 - column 5, line 40; figure 1; the references in parentheses applying to this document):

A process for the treatment of biomass (cellulosic waste materials), comprising:
forming a biomass slurry by mixing biomass with a working fluid (water);
inducing the biomass slurry to flow through an inlet into a passage (injection block 28); and
injecting a high velocity transport fluid (steam) into the slurry through a conduit communicating with the passage (conduit 70);

Steam injectors for injecting high pressure and/or high speed steam into fluids or pulps are known, see e.g. document D3 (page 2, line 9 - page 4, line 94 and figures 1-8) and document D4 (paragraphs 0015-0019). The use of a nozzle as a conduit for injecting steam is considered to be an implicit feature of the apparatus of document D1. Furthermore, the injection of high pressure steam into the pulp is assumed to result in shear forces, atomisation, formation of low pressure (partial vacuum) and high pressure regions and a condensation shock wave.

2. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 12 is not new in the sense of Article 33(2) PCT.

The document D1 discloses (abstract and column 1, line 55 - column 5, line 40; figure 1; the references in parentheses applying to this document):

A biomass treatment apparatus, comprising:

a mixing container adapted to mix a supply of biomass and a supply of working fluid to form a biomass slurry (implicit features of the process, wherein it is specified that an *aqueous mixture of cellulosic material* is fed into the reactor, see column 1, lines 55-65 and column 3, lines 22-35);

a pump adapted to pump the slurry from the mixing container (column 3, lines 35-40 and column 4, lines 5-12 and 45-68); and

at least one fluid processor adapted to receive the slurry from the mixing container (injection block 28);

wherein the fluid processor comprises:

a fluid passage having a passage inlet in fluid communication with the mixing container (pipe 26) and a passage outlet (valve 42 and pipe 44); and

a transport fluid nozzle opening into the passage intermediate the inlet and the outlet (conduits 68), the nozzle adapted to inject a high velocity transport fluid into passage (implicit features, see above).

3. Dependent claims 4, 6, 7 and 9 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty.

The subject-matter of claims 4, 6 and 7 is anticipated by D1, in which a mineral acid, preferably sulfuric acid, is injected into the slurry immediately after the point of steam injection (D1, column 3, lines 3-9 and lines 43-49; column 5, lines 10-17; figure 1, acid injection conduits 70).

The subject-matter of claim 9 is anticipated by D1, column 3, lines 9-13.

4. Dependent claims 13-18, 20, 23, 24 and 26 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements

of the PCT in respect of novelty.

The subject-matter of claim 13 is anticipated by D1, column 2, lines 46-51. The back pressure valves of claims 14 and 15 correspond to pressure valves 42 and 46 of D1 (column 5, lines 23-35). The features of claims 16-18 correspond to the acid injection conduits 70 of D1 (see passages cited under point 3), which are adjacent to the site of steam injection. The holding vessel of claim 20 corresponds to collection tank 48 of D1 (column 5, lines 32-35). The progressive cavity pump of claim 23 corresponds to the progressing cavity pump of D1, column 4, lines 5-12. The feature of claim 24 is anticipated by D1, column 1, lines 62-65 and column 3, lines 30-35, where it is specified that the reaction zone is tubular (pipe reactor). The vapour separation mechanism of claim 26 corresponds to the condenser 50 of D1 (column 5, lines 35-37 and figure 1).

5. The features of claims 5, 10, 19, 21, 22, 25 and 27 are slight constructional changes / specifications which come within the scope of the customary practice followed by persons skilled in the art, especially as the advantages thus achieved can readily be foreseen.

The features of claims 5, 19, 21, 22 and 25 are particularly evident from documents D2 and D3 (passages cited in the search report).

Re Item VIII

Certain observations on the international application

1. Claim 1 is not supported by the description as required by Article 6 PCT, as its scope is broader than justified by the description. Claim 1 describes a process for the treatment of "biomass", in which a "working fluid" and a "transport fluid" are utilized in an apparatus comprising a "passage". The claimed subject-matter encompasses *any* kind of biomass, *any* kind of fluids and *any* kind of passage, whereas support within the meaning of Article 6 PCT and disclosure within the meaning of Article 5 PCT has been given only for *lignocellulosic* biomass (i.e. *not* for biomass such as manure), *water* as the working fluid and *steam* as the transport fluid, and the passage consists

of a reactor equipped with a steam injector having specific features. It is not obvious what other kinds of biomass, fluids or devices could be suitable for the claimed process. Thus, said claim is not supported and disclosed over its whole breadth.

2. In claim 1 an attempt is made to define the method by reference to a result to be achieved. Article 6 in conjunction with Rule 6.3 (a) requires that all the essential features of the claimed invention have to be indicated in the claim in technical terms. Claims which attempt to define the invention by a result to be achieved should not be allowed, in particular if they only amount to claiming the underlying technical problem. The description (page 8, line 8 - page 9, line 30 and page 13, lines 5-18) conveys the impression that the effects described in claim 1 can only be achieved when a high pressure steam is used at supersonic velocity.
3. Claim 8 is not supported by the description as required by Article 6 PCT, as its scope is broader than justified by the description. According to claim 8, *any* gas can be used as first and/or second catalyst, whereas it is not obvious which gas other than CO₂ or air (description, page 12, lines 9-11) is suitable.
4. The application does not meet the requirements of Article 6 PCT, because claims 10 and 11 are not clear.
Since it is not specified at which step in the overall process the additional fermentation step is to be carried out, it is theoretically left open the possibility of introducing the microorganisms together with the first catalyst (acid) during the initial treatment of raw biomass. However, the description teaches otherwise (page 14, lines 4-7), and it seems impossible that alcohol can be recovered in this first step already.
5. The features of the apparatus claims 12-27 are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).